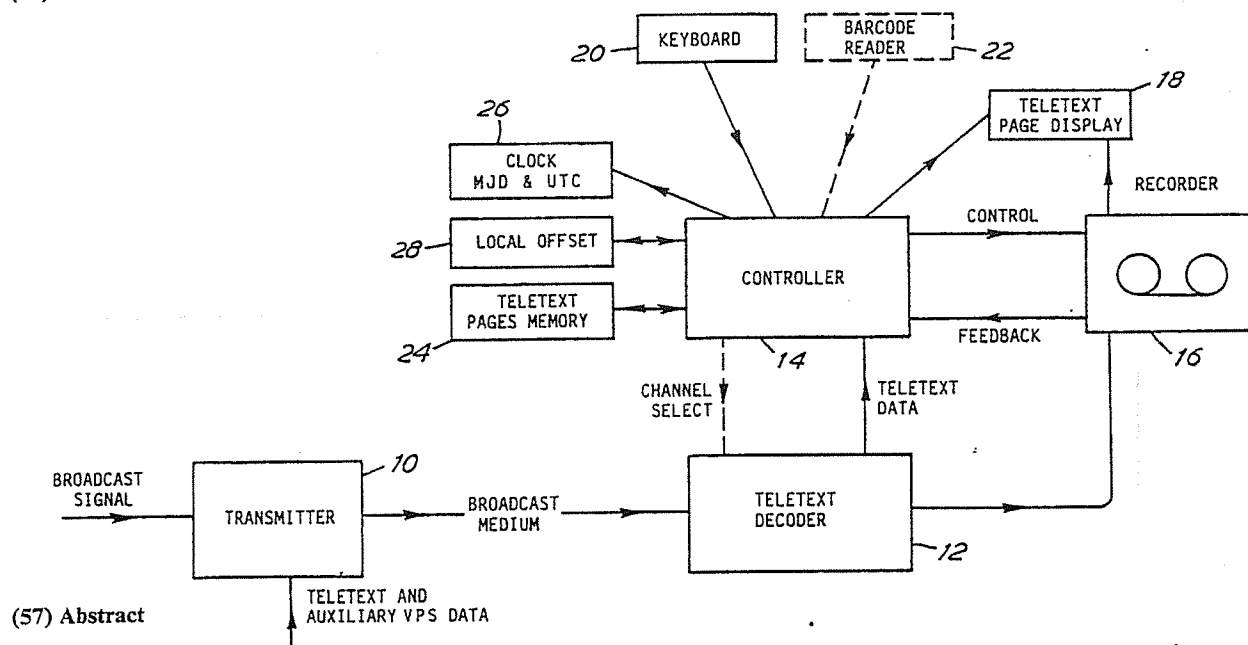




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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## (54) Title: PROGRAMMING OF BROADCAST RECEIVING DEVICES



## (57) Abstract

Teletext signals sent by a telephone transmitter (10) include teletext data and auxiliary video programming system data. For programming the receiver to record on a recorder (16) the VPS data comprises a page displaying programme items and a linked page which stores corresponding labelling information. When the user views a programme page decoded by the decoder (12) and stored in a memory (24) on a display (18) he can select a displayed item using a remote control keyboard (20). The corresponding labelling information is then extracted by a controller (14) from the linked page in the memory (24) and added to a stored list of selected items. Labelling information accompanying broadcast programmes is compared by the controller (14) with labelling information in the stored list. When a match occurs, the recorder (16) is switched on to record the programme.

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PROGRAMMING OF BROADCAST RECEIVING DEVICES

This invention relates to the automatic programming of broadcast receiving devices, referred to herein as VPS (video programming system). Methods for labelling individual broadcast television and radio programmes by means of auxiliary data carried by, for example, teletext or RDS (Radio Data System) are already established. Video recorders are being produced which can be pre-programmed to receive and record the desired programmes even when they are not broadcast at the scheduled time; these operate under control of this auxiliary data which serves to identify the required programme. Similar techniques can be used to pre-programme television, radio and teletext receivers to deliver selected programmes as they are broadcast, and to operate audio or data recorders to store such programmes.

In one implementation, namely the German VPS, video recorders are programmed using programme labels which are published alongside the programme listings in newspapers and magazines. It has been proposed that such data be entered by reading bar codes with a light pen. It has also been proposed that a teletext page, broadcast as part of the service, be used as part of the automated programming process. In one proposed system a teletext page containing the listing of the programmes also contains concealed additional information against some or all the entries, each set of information being identified by a visible symbol against that item in the list. A suitably-equipped receiver has a 'cursor' which, under user control, can be made to identify a particular symbol. If that item is selected by the user, logic within the receiver can gain access to the appropriate concealed programme labelling data, which is in fixed relationship to its corresponding symbol, e.g. the next five (concealed) characters along the text row, and it then enters this pre-programming instruction.

The system as described above is inconvenient for the teletext editor as certain fixed parts of the page area must be reserved for the labelling information which is required.

It is already known that undisplayed data may be sent in

teletext rows numbered above the twenty five displayable rows 0 to 24. The row address is six bits, allowing further "ghost" rows 25 to 31 to be transmitted and it is known to use rows 26, 27 and 28 to transmit data associated with the current page, whereas row 29 is used for magazine-related data and rows 30 and 31 for unrelated data. The ghost rows do not provide sufficient capacity for the amount of additional information which it is desirable to send, particularly having regard to the existing demands on rows 26-28 for information such as cursor positions (explained below).

It is now proposed that the necessary programme label information be stored on a related teletext 'page' which can be accessed by the receiver but which never need be displayed, indeed it may be made undisplayable. Techniques for identifying a related page are known (see, for example, our U.K. Patent 2 062 424). When the viewer indicates that the programming function is required, the decoder circuitry, without necessarily altering the displayed page, can select and store a particular linked page. A modern receiver equipped with multiple page stores may already have this linked page waiting in storage. The linked page will contain all the labels relating to the entries on the displayed page, either packed together in predetermined sequence, in the interests of minimising data transmission time and storage capacity, or set out within the linked page in positions corresponding to the entries on the displayed page.

When the user selects a particular entry, by reference to its particular adjoining symbol or possibly by moving the cursor to any point within the displayed entry, the receiver extracts the corresponding labelling information from the linked page. The receiver logic can be arranged to indicate on the displayed page which item has actually been selected using additional information stored on the linked page in order to give confirmation of the user's instruction.

The invention thus provides a broadcast teletext receiver with user operable means for selection of one of a plurality of displayed items on a first teletext page and means responsive to such selection to access labelling information corresponding to the selected item from another teletext page identified as a linked page

in the first page.

The receiver may identify the labelling information as the  $n^{\text{th}}$  such information in the linked page, where the selected displayed item is identified as  $n^{\text{th}}$  of the displayed items in the first page. The way in which the items are numbered for this purpose is immaterial. It may be the order in which the items occur down the page for example or the order in which cursor positions for the items are listed, in a manner explained below.

Alternatively the receiver may identify the labelling information as that occurring in the same position in the linked page as the selected displayed item occupies in the first page.

The invention also provides a method of broadcasting labelling information wherein a first teletext page is transmitted with a plurality of messages appearing as separate items on the displayed page and with information identifying a linked page and labelling information corresponding to each message is transmitted in the linked page.

In this method, the linked page may be rendered undisplayable.

The invention will be described in more detail, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a block diagram of an embodiment of the invention;

Fig. 2 shows a programme information page;

Fig. 3 shows the format of a pointer message; and

Fig. 4 shows the format of a pseudo page.

At a transmitter station, a transmitter 10 combines the broadcast television signal with the teletext data which is transmitted in well known manner on certain television lines in the field blanking interval and includes auxiliary VPS data, whose format will be explained below. The composite signal is transmitted on a broadcast medium and, at a receiver, a conventional teletext decoder 12 extracts the teletext data, which is fed to a controller 14, from the selected channel and passes the video signal for this channel to a video tape recorder 16. The off-air or played-back video signal is fed to the receiver display 18 acting in particular as a teletext page display. The handling of the picture signal forms no part of the present invention, is conventional and will not be further described.

- 4 -

Channel selection and also programming selections are made on a keyboard 20 which is typically a remote control unit communicating on one of several well known ways with the controller 14. A barcode reader 22 can be provided as an optional means of entering programming information.

The controller 14 is associated with a multi-page memory 24 for storing the currently displayed teletext page and associated pages. A programme information page may have a format such as that shown in Fig. 2 where each displayed text row consists of a shortened programme label (SPL), a schedule time and a programme name. The SPLs may be four decimal digit numbers assigned each week by the broadcaster to give the user a means of identifying a programme. The controller requires more information than is contained in such single codes to be able to control the recorder correctly on the basis of the auxiliary VPS data.

The VPS data accompanying a broadcast programme is a unique programme label (UPL) of say 36 or 40 bits repeated at suitable intervals and with such error checking/correcting strategies as are required. There are various possible carriers for this VPS data, including teletext ghost rows 30 and 31, and a digital stereo sound channel such as the recently defined NICAM-728 system for television sound.

The precise format of the VPS data is not important to the present invention but the following components may be included:

- NI Network identifier
- PN Programme number
- UDT Unified date and time (current)
- PD Programme duration
- ET Elapsed time (of current programme)
- SPL Shortened programme label.

NI and PN together constitute the UPL. UDT will be explained in more detail below.

In order uniquely to specify when an event occurs, and to allow a controller to arrange a series of events, from whatever source, in order of occurrence a simple increasing seconds count is needed. This should be the same at any instant throughout the world and it should be free from the discontinuities and ambiguities associated

- 5 -

with changes of time zone and daylight-saving time.

Such a system for recording date and time information is already the subject of international standardisation in the CCIR. Time is expressed in hours, minutes and seconds using Coordinated Universal Time (UTC), which is based on counting seconds from an atomic clock and which is kept within 0.9s of Greenwich Mean Time by the occasional insertion of a 61st second in the last minute of the half-year. Date is expressed as the Modified Julian Date (MJD) which is a five-digit decimal day count incremented at UTC midnight. The origin of the count (day 0) was 1858 November 17 and 1987 July 24 was MJD 47 000.

Note that the combination of MJD and UTC is ideally suited to calculating the time difference between events or to putting events in order of occurrence. Moreover, it is independent of calendar convention and so equally applicable in countries where the Gregorian calendar is not used.

The combination of UTC and MJD is already used in the UK teletext system and in the VHF/FM radiodata system (RDS) to carry time and date in machine readable form. In applications where a display of local time and date is required, or where information is to be entered manually or automatically using local time, the conversion to and from UDT can be made by adding or subtracting a "local offset" in the range -11 to +14 hours. This local offset can be stored in the decoder in non-volatile memory and amended by the user to account for daylight-saving time changes. Alternatively the decoder can be programmed to adopt and follow the local offset broadcast by a particular network of the user's choice.

Unified date and time is used in two ways in a video programming decoder. It is used in the system clock which governs the whole process, and which can be corrected or restarted using broadcast UDT transmissions (which are, of course, the same from any source at any given instant). It is also used to indicate the expected time of transmission of a particular programme.

The system of Fig.1 is thus shown with a clock 26 for keeping track of MJD and UTC and a register 28 for storing the local offset.

To enable the controller 14 to be programmed to record programmes identified by UPL, as distinct from pure time

- 6 -

programming, it must be possible to supply the controller with a selection word which contains at least the UPL and preferably also the UDT for the scheduled programme time, the PD and SPL and also MCP (menu cursor position - explained below). This represents well over 100 bits per programme item on a programme information page, which may carry as many as 20 programme items. The amount of data required cannot be accommodated in the teletext page itself, either as concealed data in rows 0 to 24 or as data in the ghost rows 26-28. These ghost rows are however used to carry firstly a pointer message and secondly MCP. The format of the pointer message is shown in Fig.3. It comprises a command word plus parameters M (magazine number), NN (page number) and SSSS (sub-code) and, when detected by the controller 14, causes the controller to load the pseudo-page identified by MNSSSS into the memory 24.

One possible format for the pseudo-page is shown in Fig.4, consisting of selection words S.....W separated by word separators WS, which allow variable length selection words. All 31 non-header lines of the page can be used. Another possibility would be fixed length selection words, in which case word separators would not be required. Fig.5 shows the format of one selection word, comprising NI, PN, UDT, PD and SPL.

The hardware of the controller 14 will not be described since it is based essentially on a dedicated or suitably programmed general purpose microprocessor interfaced to the required input and output ports. Fig.6 shows the main functions implemented by the microprocessor, excluding handling of pure manual control of the system. These functions are handled in a manner well known per se in microprocessor systems, using interrupt and/or time scheduling techniques to allocate processor time to all functions.

In block 30 ghost row data is processed. This may involve functions quite separate from those required by the present invention. So far as the present invention is concerned, such processing consists in recognising any pointer message command and then loading the identified pseudo page. The MCP data is used as described below.

In block 32 any user selections made via the keyboard 20 are processed. The selection technique itself is described below but



- 7 -

the principle is very simple. If the programmes on the programme information page (Fig.2) are numbered 1, 2, 3 etc., (whether in the order in which they appear on the page or not), the user selection of the  $n^{\text{th}}$  programme causes the  $n^{\text{th}}$  selection word (Fig.4) from the associated pseudo-page to be added to the recording schedule.

The recording schedule is an ordered list of the user selections maintained (block 34) by an algorithm which can be made as simple or sophisticated as desired. For example, it may be arranged to warn the user that a selection which has just been made will overwrite a simultaneous existing selection on another channel, that an overlap of selected programs will occur if schedules are maintained or an overlap will occur if schedules get out of step by such and such an amount.

Block 36 simply maintains the clock 26 and may also be assumed to handle adjustments to the offset stored in the register 28.

Block 38 compares received UPL's with UPL's in the recording schedule. In order that the system may know what programmes are coming in, the system is set up so that all transmitters carry all UPLs for all channels receivable in their locality. When a received UPL matches a stored UPL in the reading schedule, the appropriate decisions are taken and commands are issued (block 40) to effect channel selection and to turn the recorder on and off. Again, algorithms can be built into block 38 to resolve actual conflicts. For example, a recording currently being recorded may always be given precedence over another selected programme which comes on before the first recording is finished. As each selected program is recorded it is removed from the recording schedule.

The operations in blocks 32 and 34 will now be considered in more detail. Three possibilities exist. In the first place the keyboard can be used to enter information. It would be unrealistic to expect the user to enter complete UPL's but the user could enter SPL's (four digits) and the microprocessor can then search the pseudo-page (Fig.4) to find the SW containing the SPL which has been entered. The SW thus found is passed to block 34 for adding to the recording schedule.

In the second place, a process of menu selection, known per se, can be used, as in German VPS. The cursor (e.g. a highlight bar) is

stepped from item to item and the user merely presses an "enter" key (or a "delete" key if correcting an erroneous entry) when the cursor is on a desired item. The MCP data in the ghost lines of the programme information page identify the X,Y coordinate pairs of all cursor positions in turn to enable the cursor to be stepped correctly (e.g. skipping the second line of a two-line entry). This technique is known per se.

The cursor stepping can be automatic (e.g. one step per second) or commanded by a user "step" key.

The third possibility is to use the barcode reader 22. This could enter UPLs directly, without reliance on the invention or could enter SPLs to be processed in the same way as those entered on the keyboard.

- 9 -

## CLAIMS:

1. A broadcast teletext receiver comprising user operable means for selection of one of a plurality of displayed items on a first teletext page, characterised by means responsive to such selection to access labelling information corresponding to the selected item from another teletext page identified as a linked page in the first page.
2. A receiver according to claim 1, characterised in that the receiver identifies the labelling information as the  $n^{\text{th}}$  such information in the linked page, where the selected displayed item is identified as the  $n^{\text{th}}$  of the displayed items in the first page.
3. A receiver according to claim 1, characterised in that the receiver identifies the labelling information as that occurring in the same position in the linked page as the selected displayed item occupies in the first page.
4. A receiver according to claim 1, 2 or 3, characterised by means responsive to selection of an item to access the corresponding labelling information and to add this accessed information to a stored list of user selections.
5. A receiver according to claim 4, characterised by means for comparing labelling information accompanying received programmes with the labelling information in the stored list and, when a match occurs, operative to provide a switching signal for enabling the selected item to be recorded.
6. A receiver according to claims 1 to 5, characterised in that the user operable selection means comprise means for entering a short code in a displayed item and in that the access means are responsive to the entered code to access the labelling information corresponding thereto.
7. A receiver according to claims 1 to 5, characterised in that

the user operable selection means comprise means for stepping a cursor from displayed item to displayed item and an entry key whose operation selects the item currently identified by the cursor.

8. A method of broadcasting labelling information wherein a first teletext page is transmitted with a plurality of messages appearing as separate items on the displayed page and with information identifying a linked page and labelling information corresponding to each message is transmitted in the linked page.

9. A method according to claim 8, wherein the identifying information is included in a non-displayable teletext line of the first page.

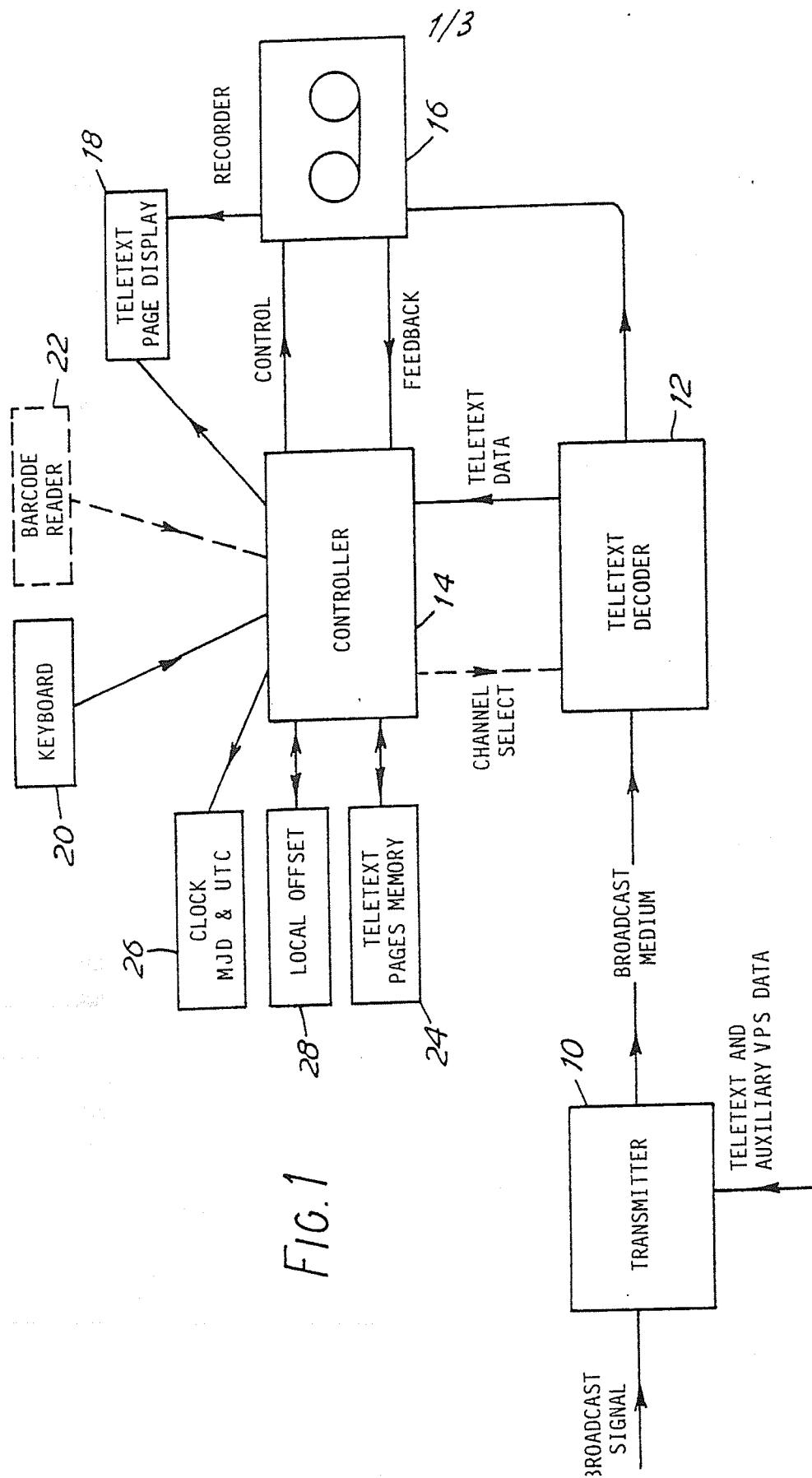
10. A method according to claim 8 or 9, wherein each labelling information includes a unique programme label.

11. A method according to claim 10, wherein each labelling information further includes data identifying the scheduled date and time of transmission of the programme.

12. A method according to claim 10 or 11, wherein each labelling information further includes data indicating the duration of the programme.

13. A method according to claims 10, 11 or 12, wherein each labelling information further includes a short code identifying the programme within a short time span consisting of a plurality of days only.

14. A method according to any of claims 8 to 13, wherein the linked page includes teletext codes rendering the page undisplayable.



2/3

FIG. 2

Fig. 2

TONIGHT'S PROGRAMMES			
SPL	TIME	PROGRAMME	NAME
SPL	TIME	PROGRAMME	NAME
ROW 24	SPL	TIME	PROGRAMME NAME
GHOST ROWS {	ROW 25		
	ROW 26		
	ROW 27	POINTER MESSAGE, MCP	
	ROW 28		
	ROW 29		
	ROW 30		
	ROW 31		

FIG. 3

COMMAND	M	N	N	S	S	S	S
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FIG. 5

NI	PN	UDT	PD	SPL
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3/3

FIG. 4

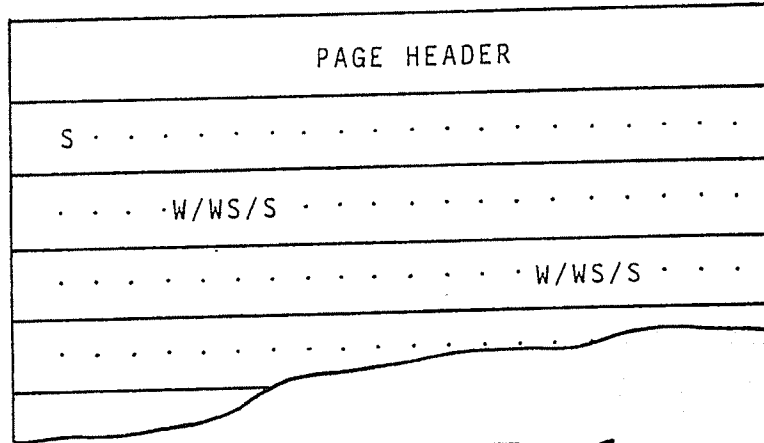
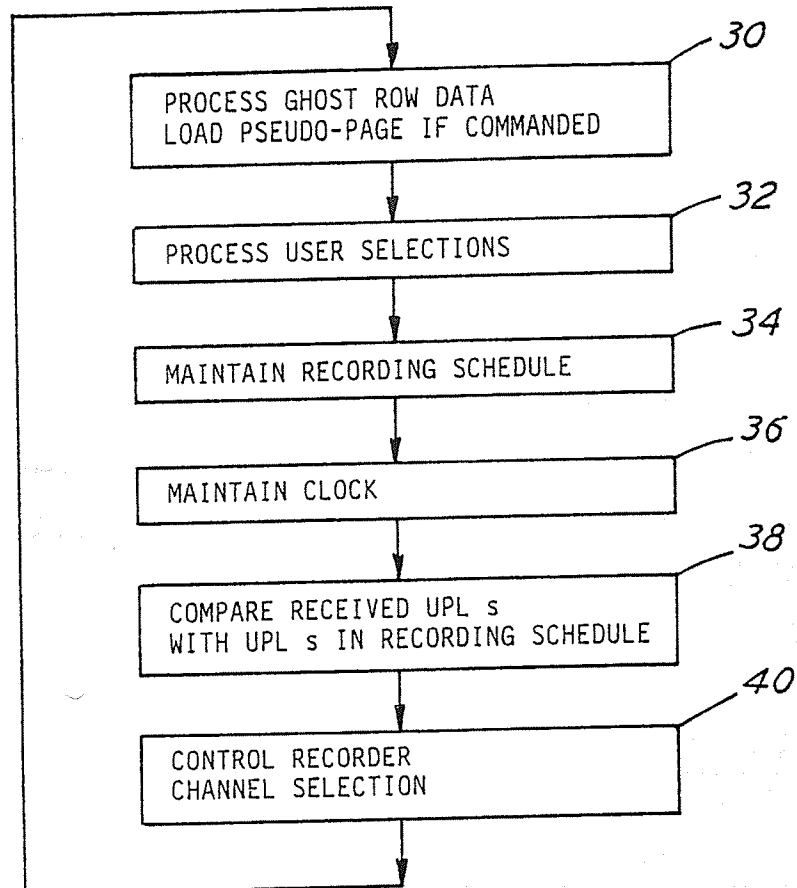


FIG. 6



# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 87/00884

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC <sup>4</sup> : H 04 N 7/087		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC <sup>4</sup>	H 04 N	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>9</sup>		
Category <sup>*</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y	DE, A, 3335082 (TELEFUNKEN FERNSEH UND RUNDfunk GmbH) 11 April 1985 see page 7, line 13 - page 10, line 16 --	1-12
Y	GB, A, 2146878 (PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LTD) 24 April 1985 see page 3, line 85 - page 4, line 24 --	1-12
Y	EP, A3, 0037077 (SIEMENS AG) 7 October 1981 see page 7, line 6 - page 13, line 6 --	1-12
Y	Rundfunktechnische Mitteilungen, volume 29, no. 4, July/August 1985, (Norderstedt, DE), A. Heller: "VPS - Ein neues System zur beitragsgesteuerten Programmaufzeichnung" pages 161-169 see the whole document -- . / .	1-12
<p><sup>*</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
9th March 1988	18 APR 1988	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	P.C.G. VAN DER PUTTEN	



III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category*	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	Funktechnik, volume 41, no. 6, June 1986, (Heidelberg, DE), C.L.M.: "Videorecorder-Programmieren mit VPV", pages 249-251 see page 249, right-hand column, lines 3-11; page 250, middle column, lines 13-16; page 251, left-hand column, line 19 - middle column, line 23 --	1
A	US, A, 4290062 (MARTI) 15 September 1981 see the whole abstract --	1,14
A	EP, A1, 0128093 (TEXAS INSTRUMENTS INC.) 12 December 1984 -----	

ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.

GB 8700884

SA 19792

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 08/04/88. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 3335082	11-04-85	DE-A, C 3337204	25-04-85
GB-A- 2146878	24-04-85	None	
EP-A- 0037077	07-10-81	DE-A, C 3012429	08-10-81
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		GB-A, B 2022378	12-12-79
		JP-A- 54126429	01-10-79
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EP-A- 0128093	12-12-84	FR-A, B 2547146	07-12-84
		JP-A- 60018080	30-01-85